

Review of: "Critical Review on Carbon Nanomaterial Based Electrochemical Sensing of Dopamine the Vital Neurotransmitter"

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Potential competing interests: No potential competing interests to declare.

Introduction:

Your introduction clearly sets up the scope of the review, emphasizing the growing importance of dopamine sensing techniques, particularly in electrochemical methods. You provide context by comparing enzymatic and non-enzymatic approaches, which is helpful for readers unfamiliar with the topic. You may want to refine the sentence "However, non-enzymatic electrochemical sensing techniques have proven advantageous compared to enzymatic techniques due to their ability to detect a wide range of analytes" by further clarifying which specific analytes and their relevance to dopamine detection.

Suggestion: Consider adding a brief sentence explaining why non-enzymatic techniques are increasingly preferred in recent studies (e.g., cost-effectiveness, reduced complexity, or faster response times).

Dopamine Detection Methods:

This section provides a solid comparison between enzymatic and non-enzymatic methods, with a clear explanation of the advantages of non-enzymatic techniques. You do well to focus on the simplicity, speed, and cost-effectiveness of non-enzymatic methods, which is key for the reader.

Suggestion: It would be helpful to briefly define what makes a technique "non-enzymatic" in the context of electrochemical sensing for those who may not have a deep background in this field. A short definition or clarification could provide better context for your broader audience.

Electrode Materials:

You've done an excellent job here detailing the role of modified electrodes in dopamine sensing, especially emphasizing carbonaceous materials. The mention of graphene and carbon nanotubes is well-placed, and the discussion on their electrochemical advantages adds depth.

Suggestion: A minor improvement could be to add a few specific examples or recent advancements in the development of these materials. For example, citing a particular paper or study that demonstrated the success of a graphene-based electrode in real-world applications would provide practical relevance and strengthen this section.

Interference and Sensitivity:

Addressing the issue of interferences, such as the simultaneous detection of dopamine, AA, and UA, is an excellent point. You clearly describe the challenges posed by overlapping peaks and the need for selectivity in practical settings.

Suggestion: You mention some misconceptions around standard dopamine concentrations in research. It would be helpful to elaborate on these misconceptions by providing specific examples or studies that highlight how these errors affect the overall performance of sensing devices. A little more specificity would clarify why these are problematic.

Performance and Commercialization:

The emphasis on key performance metrics like sensitivity, selectivity, and reusability in carbonaceous nanomaterial-based dopamine sensors is spot-on. You also do well to point out the potential for commercialization, which helps to connect the research to real-world applications.

Suggestion: To further strengthen this, you could include a brief mention of some specific market-ready products or prototypes that utilize similar technologies. Even if they are not fully commercialized yet, giving readers examples of how close the field is to practical applications could be very impactful.

Conclusion:

Your conclusion provides a comprehensive wrap-up, highlighting the advances and challenges within the electrochemical dopamine detection field. It is a strong summary that reinforces the importance of these non-enzymatic methods and their potential for real-world applications.

Suggestion: A brief mention of future directions for research or potential breakthroughs (e.g., integrating AI or machine learning into dopamine detection systems, or advancements in microfluidics) could offer a forward-looking perspective and inspire further discussion or research on the topic.

Overall Thoughts:

Your review does a great job of balancing technical depth with accessibility, making it a valuable resource for both experts and those new to the field. Your sections are well-structured, and the flow between ideas is smooth. You have a strong grasp of the key issues in dopamine sensing, and your focus on carbonaceous nanomaterials is insightful and well-supported by current literature.